

Appendix I

Technical Memorandum



City of Santa Clara Sanitary Sewer Hydraulic Modeling

Subject: Results of Sanitary Sewer Hydraulic Modeling: Development Group #1
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1 Introduction

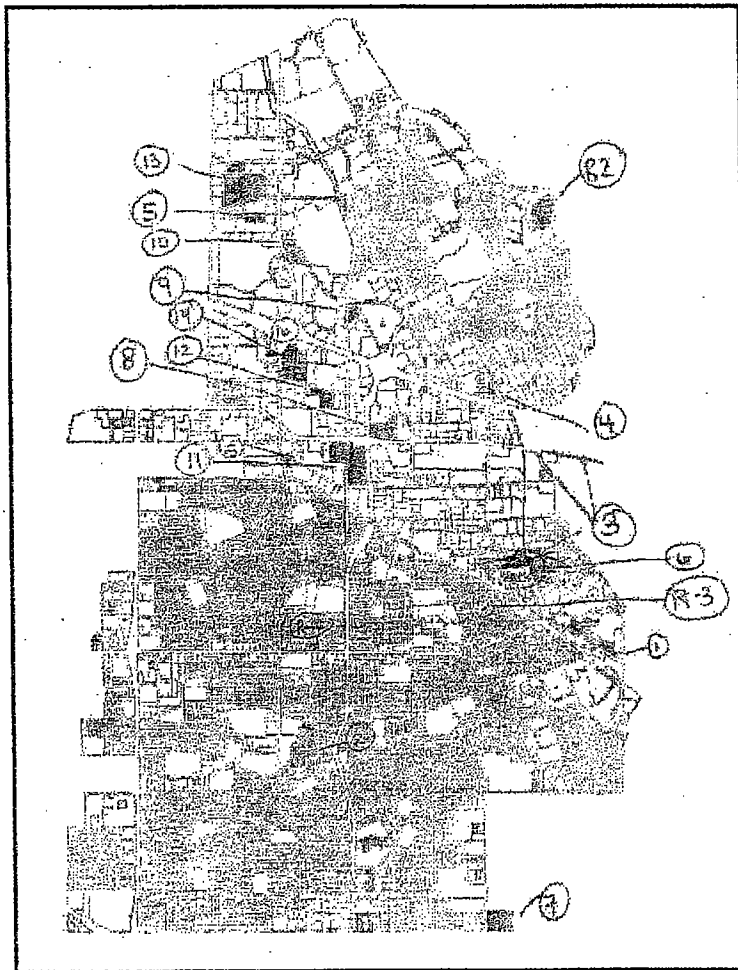
At the City's request, RMC has evaluated the impact of 21 existing and proposed developments using the Sanitary Sewer Hydraulic Model. This technical memorandum (TM) outlines the approach, assumptions, and results of the hydraulic analysis.

The following developments were evaluated as Development Group #1:

Table 1-1 Development Group #1

Number	Development
1	BART Extension (VTA)
2	SC Swim Center
3	Data Center- Lafayette
4	Data Center- Bassett
5	Data Center- Old Ironsides
6	Date Center - Dupont Fabros
7	Valley Fair Expansion
8	Sobrato- Lawson Lane
9	South Bay Development
10A	Sobrato- GAP at Mission College: North parcel
10B	Sobrato- GAP at Mission College: South parcel
11A	Harvest Properties: West parcel
11B	Harvest Properties: East parcels
12	Lowe Enterprises
13	Yahoo/Equity Partners
14	Equity Office Properties/VTBS
15	Restaurant
16	Hotel
R-1	Malley/Wheels & Deals
R-2	Prometheus
R-3	CORE

Figure 1-1 Map of Developments



This TM is organized in the following manner:

- Approach
- Development Information
- Results

2 Approach

The Sanitary Sewer Hydraulic Model (model) was used to evaluate the impact of the developments on the sanitary sewer system. The model was first developed for the 2007 Sanitary Sewer Capacity Assessment. It was calibrated based on existing development information, water use data, and flow monitoring data collected in 2006. The "Future Scenario" model was used for this additional analysis so that all currently planned major developments and redevelopments, as well as potential increased densities in mixed use and transit-oriented mixed use and commercial/office areas consistent with the City's 2010 General Plan and General Plan Update, were included. The Future Scenario model includes the proposed capacity improvement projects as recommended in the 2007 Capacity Assessment with the West-to-East Project (Walsh Project) option.

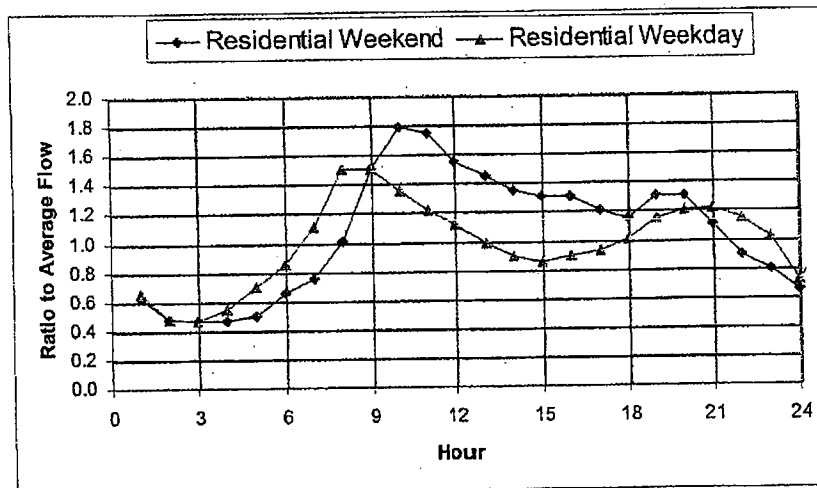
Flows were simulated in the hydraulic model after the development flows outlined in this TM were added. Only sanitary flows were added to the model (i.e., no increase in infiltration/inflow flows was assumed to result from the new developments). The modeled pipelines were then evaluated under peak wet weather flow conditions for a 10-year design storm to see if surcharging occurred, using the same procedures as used in the 2007 Capacity Assessment.

2.1 Unit Flow Factors

For cases where the developer provided number of units or size of development (Developments 7-16 and R-1, R-2, and R-3), RMC used the following wastewater unit flow factors to calculate average flow for each of the developments. The Wastewater Unit Flow Factors are shown below in Table 1-1. The land-use appropriate diurnal profiles (e.g. residential, commercial, industrial) from the Capacity Assessment were used to simulate peak flow based on these average flow values. These diurnal curves are shown below in Figure 1-1.

RMC used peak flow data where it was provided by the developers. Where peak flow was provided, we divided this flow by the peaking factor of the appropriate diurnal curve. Thus, during model runs the simulated peak flow accurately represented the peak flow that was provided by the developer. Where the developer did not provide a peak flow number, we applied an appropriate diurnal curve to estimate peak flow based on the type of development. Our assumptions are outlined on a case-by-case basis in Section 2.

Figure 2-1 Diurnal Curves



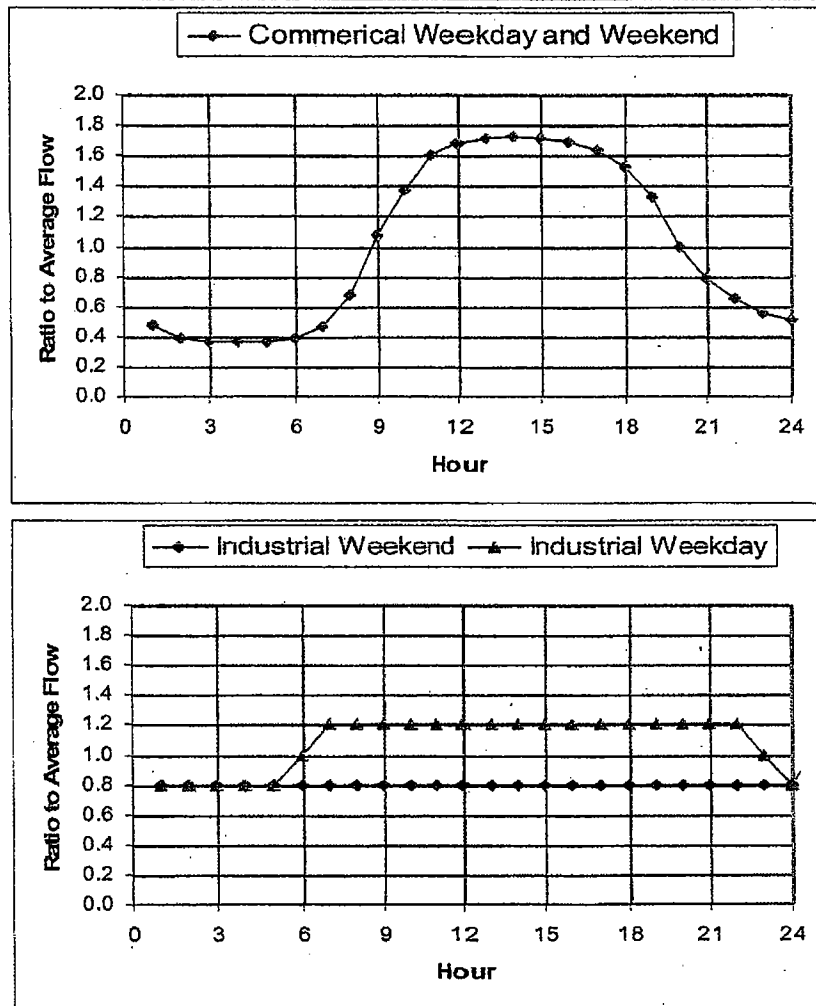


Table 2-1 Wastewater Unit Flow Factors

Type of Development	Unit Flow Factor	Basis
Single Family Detached	245 gpd/DU	3.5 people/DU @ 70 gpcd
Townhouses/Condominiums	175 gpd/DU	2.5 people/DU @ 70 gpcd
Apartments	154 gpd/DU	2.2 people/DU @ 70 gpcd
Hotels	100 gpd/room	
Commercial/Office	0.1 gpd/sq. ft.	
Office/R&D	0.15 gpd/sq. ft.	

2.2 Accounting for Flows Already in Model

RMC subtracted out the Capacity Assessment flow for the parcels in question from the model to avoid double counting the flow in 20 of the 21 developments. The Capacity Assessment flow is either the existing flow (for parcels that are already developed) or the projected future development or redevelopment flow based on the land uses and densities assumed for the 2007 Capacity Assessment. Only one development parcel was projected to contribute less flow than what was assumed from the 2006

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Development Group #1

water billing data in the 2007 Capacity Assessment, Development #15: Restaurant. In this case the Capacity Assessment flows for this parcel were used in the model.

For the four developments (5, 10A, 10B, and 13) located inside the Capacity Assessment "North Santa Clara Intensification Area," the incremental intensification flow was subtracted out in addition to the flows outlined above to avoid double counting the flow for the parcels.

3 Development Information

This section of the TM documents the background information provided for each of the developments and the assumptions made where specific information was not provided.

Development Number	1
Name	BART Extension (VTA)
APN	23006030, 23006042
Address	Railroad Ave.
Type of Development	Train Station
Units/Area	NA
Development Average Flow	0.861 MGD
Status	Future/Planned
Information Provided by Developer	Based on BART extension "Scenario 2" with a peak flow of 598 gallons per minute (gpm). Includes flow from three proposed facilities: yard, shop, and station.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	2
Name	SC Swim Center
APN	29029009
Address	Central Park
Type of Development	Swimming Pool
Units/Area	NA
Development Average Flow	0.1921 MGD
Status	Future/Planned
Information Provided by Developer	Based on maximum flow of 200 gpm from the backwash of the proposed new sand filter tanks.
Trunk System Modeling Results	Slight surcharging occurs in some downstream trunk lines under peak wet weather flow event.

Development Number	3
Name	Data Center- Lafayette
APN	22403085
Address	2045 Lafayette St.
Type of Development	Data Center
Units/Area	NA
Development Average Flow	0.3602 MGD
Status	Existing
Information Provided by Developer	Average flow is 23,938 gpd. Specific information was not provided on peak flow so it was assumed that the peak flow would be 250 gpm, based on information from similar data center developments.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	4
Name	Data Center- Bassett
APN	10111003 (aka 09711208)
Address	3205 Bassett St.
Type of Development	Data Center
Units/Area	NA
Development Average Flow	0.360 MGD
Status	Existing
Information Provided by Developer	Average flow is 5,526 gpd. Specific information was not provided on peak flow so it was assumed that the peak flow would be 250 gpm, based on information from similar data center developments.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	5
Name	Data Center- Old Ironsides
APN	10404077
Address	4650 Old Ironsides
Type of Development	Data Center
Units/Area	NA
Development Average Flow	0.432 MGD
Status	Existing
Information Provided by Developer	Peak flow of 300 gpm for cooling tower drain.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	6
Name	Data Center: Dupont Fabros
APN	23003075, 23003080
Address	555 Reed St.
Type of Development	Data Center
Units/Area	NA
Development Average Flow	0.280 MGD
Status	Future/Planned
Information Provided by Developer	Average flow is 155,610 gpd. Peak flow of 180 gpm from chiller plant blowdown/backwash plus 15 gpm additional flow from site.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	7
Name	Valley Fair Expansion
APN	27443040, 27443041, 27443043, 27443061, 27443062, 27443071
Address	2855 Stevens Creek Bl.
Type of Development	Commercial
Units/Area	23,000 SF
Development Average Flow	0.0035 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	8
Name	Sobrato- Lawson Lane
APN	22444015, 22444016, 22444018
Address	2200-2231 Lawson Lane
Type of Development	Office/R&D
Units/Area	516,000 SF
Development Average Flow	0.0774 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	9
Name	South Bay Development
APN	10413098,10413099
Address	2350 Mission College Bl.
Type of Development	Office/R&D
Units/Area	564,200 SF
Development Average Flow	0.0846 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	10A
Name	Sobrato- GAP at Mission College: north parcel
APN	10442020
Address	GAP @ Mission College Bl.
Type of Development	Office/R&D
Units/Area	219,107 SF
Development Average Flow	0.033 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	10B
Name	Sobrato- GAP at Mission College: south parcel
APN	10442009
Address	GAP @ Mission College Bl.
Type of Development	Office/R&D
Units/Area	585,882 SF
Development Average Flow	0.088 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Slight surcharging occurs in some downstream trunk lines under peak wet weather flow event.

Development Number	11A
Name	Harvest Properties: west parcel
APN	22411066
Address	San Tomas Exp. @ Walsh
Type of Development	Office/R&D
Units/Area	650,000 SF
Development Average Flow	0.0975 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Slight surcharging occurs in some downstream trunk lines under peak wet weather flow event.

Development Number	11B
Name	Harvest Properties: east parcel
APN	22411065
Address	San Tomas Exp. @ Walsh
Type of Development	Office/R&D
Units/Area	1,300,000 SF
Development Average Flow	0.1950 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Slight surcharging occurs in some downstream trunk lines under peak wet weather flow event.

Development Number	12
Name	Lowe Enterprises
APN	21629060, 21629111, 21629117
Address	3250 Scott Bl.
Type of Development	Office/R&D
Units/Area	215,020 SF
Development Average Flow	0.0323 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Slight surcharging occurs in some downstream trunk lines under peak wet weather flow event.

Development Number	13
Name	Yahoo/Equity Partners
APN	10404064, 10404065, 10404111, 10404112, 10404113, 10404142, 10404150
Address	4850 Old Ironsides
Type of Development	Office/R&D
Units/Area	464,000 SF
Development Average Flow	0.070 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	14
Name	Equity Office Properties/VTBS
APN	21645009, 21645011, 21645014, 21645019, 21645027, 21645028, 21645031
Address	Augustine @ Bowers
Type of Development	Office/R&D
Units/Area	1,402,600 SF
Development Average Flow	0.2104 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Slight surcharging occurs in some downstream trunk lines under peak wet weather flow event.

Development Number	15 (not added to model since development did not increase flow at parcel)
Name	Restaurant
APN	21628063
Address	2805 Bowers Ave.
Type of Development	Restaurant
Units/Area	10,000 SF
Development Average Flow	0.0015 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors (estimated as industrial) shown in Section 1 of TM.
Trunk System Modeling Results	Not modeled; no impact to trunk line.

Development Number	16
Name	Hotel
APN	21630056
Address	2875 Lakeside Dr.
Type of Development	Hotel
Units/Area	170 rooms
Development Average Flow	0.0170 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	R-1
Name	Malley/Wheels & Deals
APN	21601008
Address	ECR @ Saratoga Creek
Type of Development	Mixed use
Units/Area	60 condos and 3,300 SF
Development Average Flow	0.011 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Slight surcharging occurs in some downstream trunk lines under peak wet weather flow event.

Development Number	R-2
Name	Prometheus
APN	09708097, 09708098, 09708099, 09708100
Address	502 Mansion Park
Type of Development	Residential
Units/Area	124 apartments
Development Average Flow	0.0191 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

Development Number	R-3
Name	CORE
APN	22424051, 22424052, 22424053
Address	1828-1878 Main St.
Type of Development	Residential
Units/Area	28 apartments
Development Average Flow	0.004 MGD
Status	Future/Planned
Information Provided by Developer	Flow based on wastewater unit flow factors shown in Section 1 of TM.
Trunk System Modeling Results	Downstream trunk lines do not surcharge under peak wet weather flow event.

4 Results

As noted previously, the modeled network used for this analysis was the "solutions model" developed for the 2007 Capacity Assessment using the West-to-East Project (Walsh Ave. Project) option. This network includes the capacity improvement projects recommended in the 2007 Capacity Assessment. To assess the impact of the 21 proposed development projects, all of the modeled pipes downstream of each of the developments were carefully examined for surcharging. None of the developments modeled as part of this evaluation triggered any new capacity improvements. Therefore, no additional capacity projects other than those already identified in the 2007 Capacity Assessment are needed.

That being said, several of the developments listed above contribute to a trunk line that experiences slight surcharging (less than 1 foot) under a peak wet weather flow event. These results are noted in the Development Information tables. It should also be noted that many parts of the sanitary sewer system are "filling up," and it is likely that future developments, not evaluated here, that exceed the density or intensity of uses assumed in the 2007 Capacity Assessment, may trigger the need for additional capacity improvements.